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(54) **FILLING NOZZLE COMPRISING A SUCTION CHANNEL**

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(58) **Field of Classification Search**
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See application file for complete search history.

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(57) **ABSTRACT**

A filler station for a packaging installation for packaging a substance in containers, the station having a filler spout having a spout body with a bottom end provided with an orifice fitted with a controlled delivery valve. The spout is provided with at least one suction channel extending in the bottom end of the spout body between the outside of the filler station and the inside of the spout body so as to open out inside the spout body above the orifice. An associated installation and method.

10 Claims, 3 Drawing Sheets

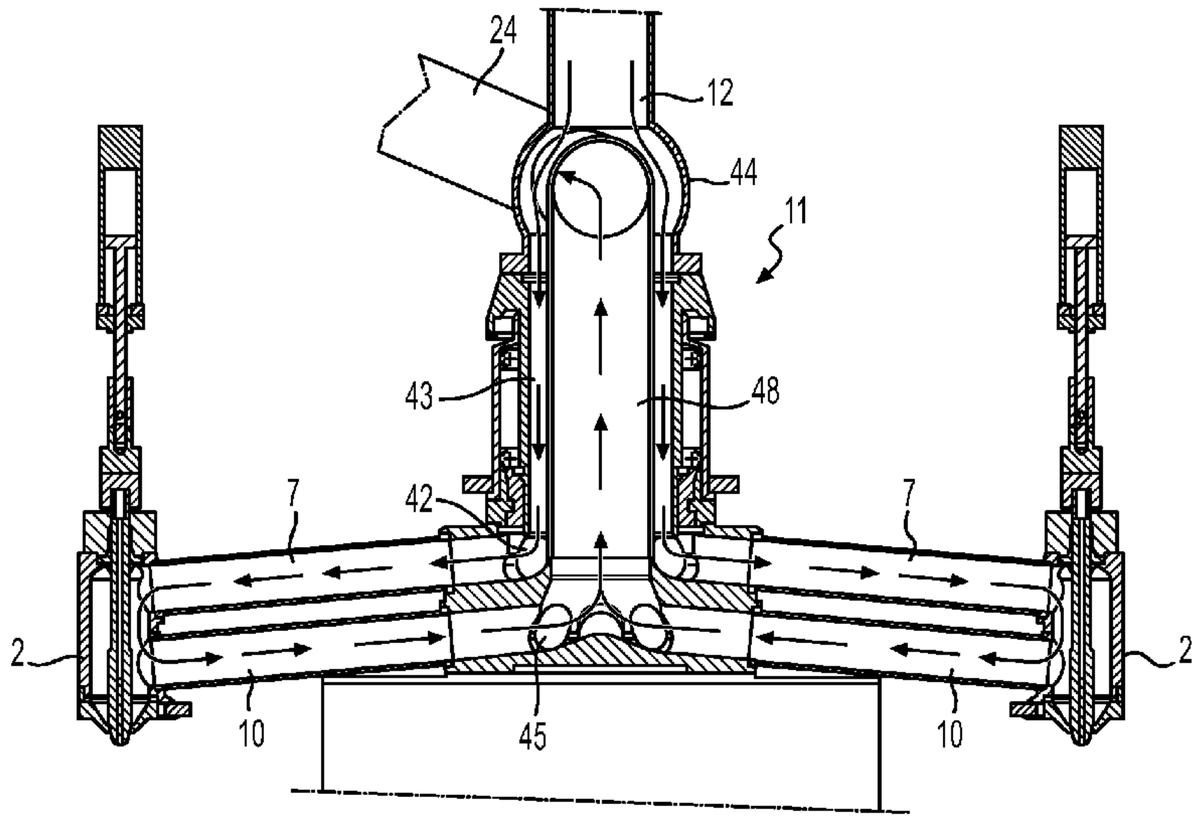

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Fig. 1

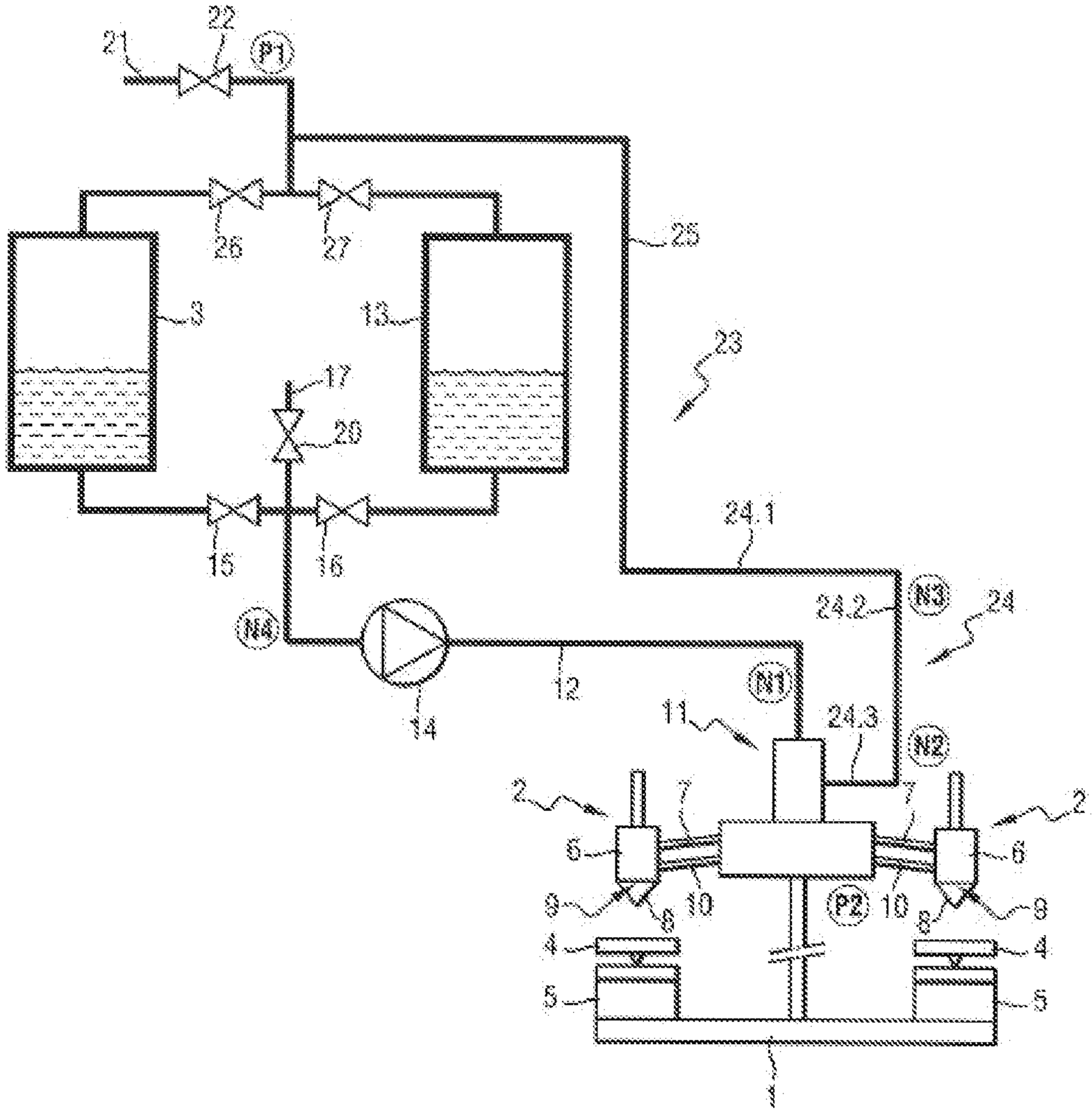
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Fig. 2

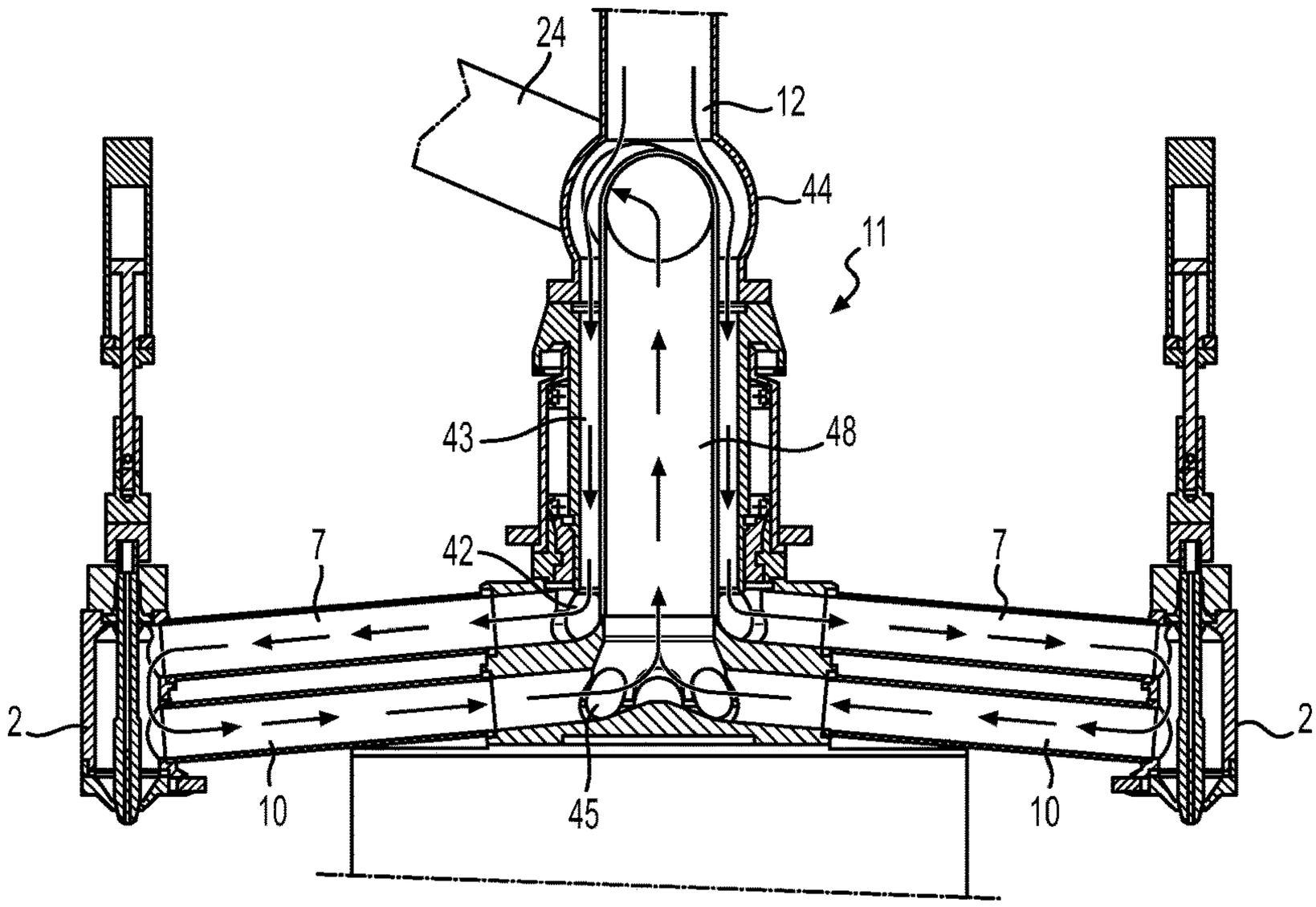


Fig. 3

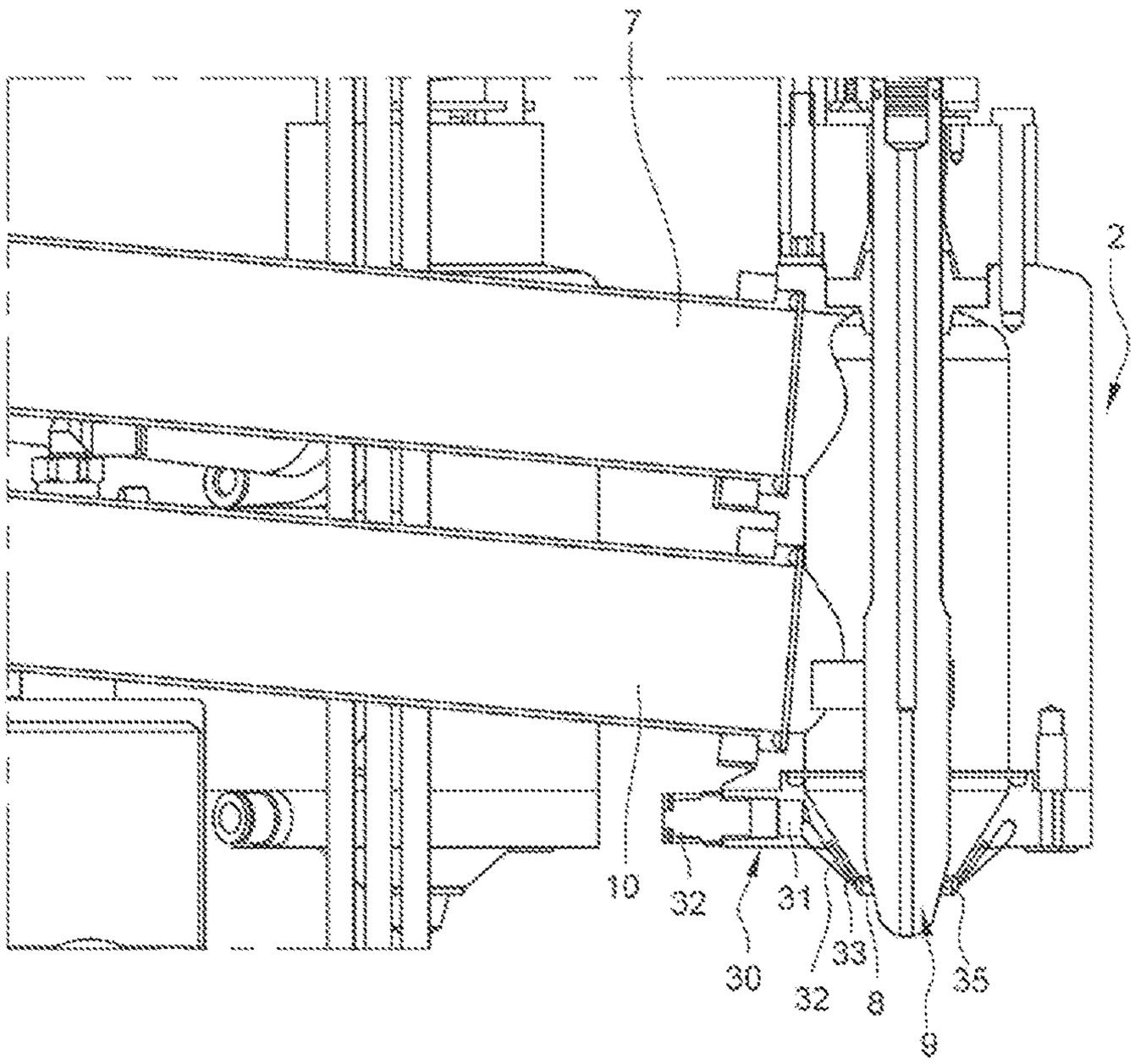
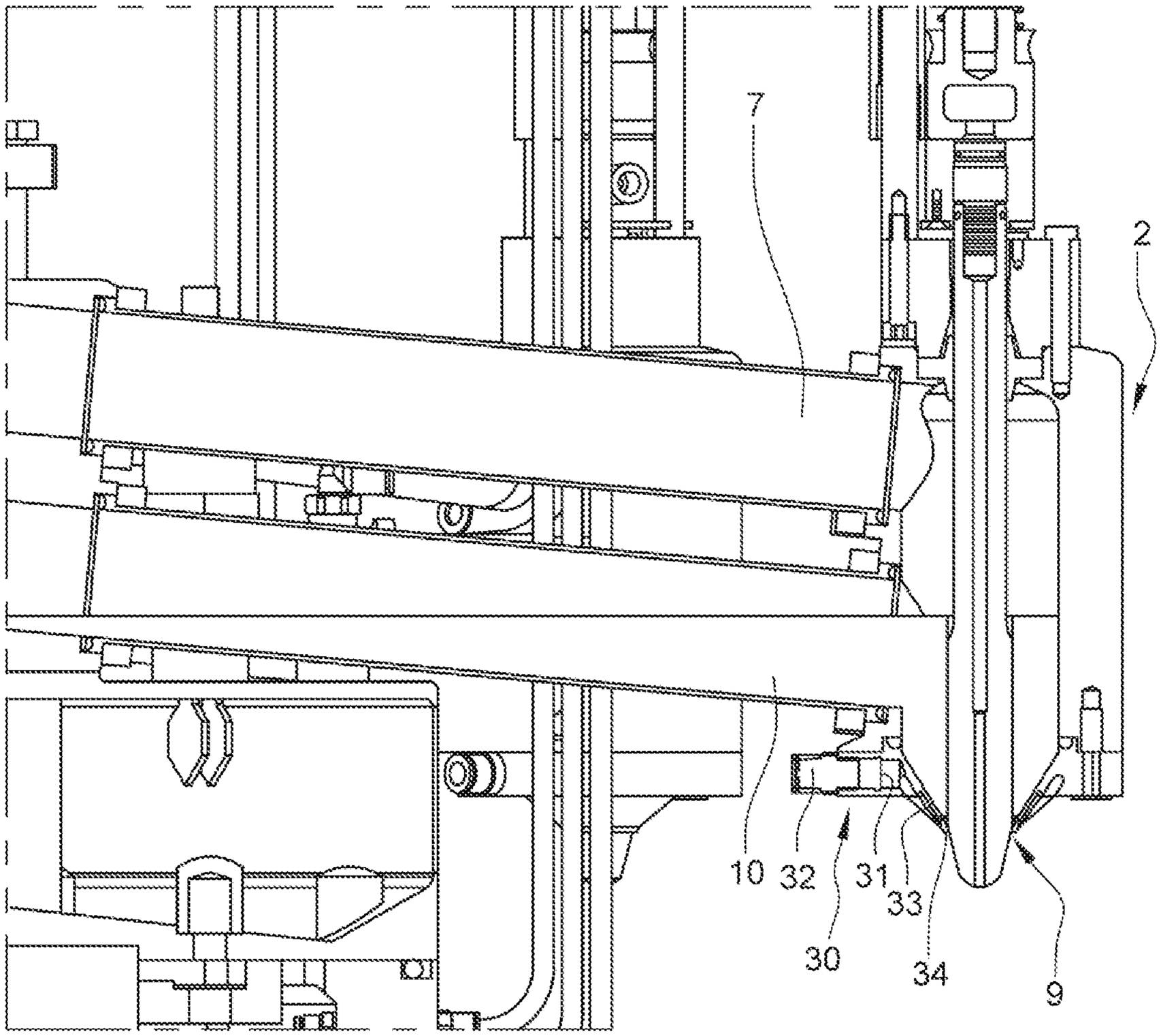


Fig. 4



FILLING NOZZLE COMPRISING A SUCTION CHANNEL

BACKGROUND OF THE INVENTION

Installations for packaging a substance are known that comprise a series of filler stations, each having a filler spout and a support member for supporting a container under the filler spout in order to fill successive containers with a predetermined quantity of substance.

In those installations, the filler spout comprises a spout body having a top end that is connected to a feed duct and a bottom end that is provided with a controlled delivery valve.

When changing substance, the old substance is allowed to flow out through the bottom orifice so that the old substance is collected in a collector present in the installation, thereby purging the installation of the old substance.

The drawback is that collectors are generally rather complex and of considerable size. Furthermore, use of a collector generally requires the intervention of an operator, which is an obstacle to automating changeover stages.

OBJECT OF THE INVENTION

An object of the invention is to propose a solution for reducing the size of a packaging installation.

SUMMARY OF THE INVENTION

In order to achieve this object, the invention provides a filler station for a packaging installation for packaging a substance in containers, the station comprising a filler spout having a spout body with a bottom end provided with an orifice fitted with a controlled delivery valve.

According to invention, the spout is provided with at least one suction channel extending in the bottom end of the spout body between the outside of the filler station and the inside of the spout body so as to open out inside the spout body above the orifice, the suction channel thus being designed to extend in the bottom end of the spout body between the outside of the packaging installation and the inside of the spout body so as to open out inside the spout body above the orifice.

Thus, the invention proposes fitting the bottom portion of the spout with a suction channel that opens out to the outside of the filler station.

After a feed vessel to which the filler station is connected has been emptied by filling the containers, the delivery valve of the filler station is closed. There might then remain a small quantity of substance in the control station, which substance can be sucked out from the outside by means of the suction channel, while keeping the delivery valve closed.

The invention thus makes it simple to prepare a filler station for packaging a new substance while having a control station that is small in size.

It is thus possible to do without the large-sized collectors of the prior art that were used to cooperate with the spouts, with their delivery valves open, in order to drain the rest of any remaining substance in order to prepare the filler station for receiving a new substance.

Optionally, the suction channel has a connection segment extending radially in the spout body so as to open out at a first end to the outside of the spout body.

Optionally, the first end of the connection segment includes a coupling.

Optionally, at its second end, the connection segment is extended by a distribution portion that matches the shape of the end of the spout body.

Optionally, the distribution portion is extended by a junction portion extending between the distribution portion and the inside of the spout body.

Optionally, the suction channel opens out inside the spout body immediately above the seat of the delivery valve.

The invention also provides a packaging installation including a filler station as described above.

The installation also provides a method of draining a station as described above, the method comprising the steps of connecting suction means to the suction channel and sucking out substance remaining in said station via the suction means while keeping the delivery valve closed.

Other characteristics and advantages of the invention appear on reading the following description of a particular, nonlimiting embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention can be better understood in the light of the following description given with reference to the accompanying figures, in which:

FIG. **1** is an overall view of an installation in a particular embodiment of the invention;

FIG. **2** is a diagrammatic axial section view on a vertical plane showing a connection member in the installation shown in FIG. **1**;

FIG. **3** is a view on a larger scale of a portion of the connection member shown in FIG. **2**;

FIG. **4** is a view similar to the view of FIG. **3**, with the substance still being present in the control station of the installation shown in FIG. **1**, the delivery valve of said station being closed.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIG. **1**, the filler installation shown comprises in conventional manner a rotary carousel having a rotary structure **1** with filler stations mounted thereon, each having a filler spout **2** and a support member **4** for supporting a container under the filler spout, each support member **4** being associated with a weighing member **5** for acting in association with a control unit (not shown) for controlling the corresponding filler spout **2**.

Each filler spout **2** is thus vertically above a given container without being in contact therewith. Each filler spout **2** is offset from the associated container.

Each filler spout **2** has a spout body **6** with a top end connected to a supply pipe **7** for supplying the filler spout **2**, and a bottom end provided with an orifice **8** fitted with a controlled delivery valve **9**.

Each filler spout **2** is also fitted with a return pipe **10** having one end fastened to the spout body **6** and opening out into the spout body **6** above the delivery valve **9** and below the zone where the supply pipe **7** opens out into the spout body **6**, and an opposite end connected to a multichannel connection member **11**, or "manifold", of structure that is described below with reference to FIG. **2**. Each filler spout **2** is provided with a single supply pipe and/or a single return pipe.

The multichannel connection member **11** is connected firstly to a general feed duct **12**, which is itself connected via a pump **14** to a bottom branch of a cross-shaped coupling.

The pump **14** is a positive displacement pump. The pump is a pump having an asynchronous motor or a pump having a brushless motor.

One of the side branches of the coupling is connected to a first feed vessel **3** via a first control valve **15** and the other of the side branches of the coupling is connected, in this example, to a second feed vessel **13** via a second control valve **16**.

Each of the feed vessels **3** and **13** can thus be put selectively into communication with the general feed duct by controlling the two control valves **15** and **16**.

Optionally, a first feed duct **17** for feeding air under pressure is also connected, via a control valve **20**, to the top branch of the coupling and thus to the general feed duct **12**. This first feed duct **17** for feeding air under pressure is thus connected to the general feed duct **12** upstream from the pump **14**.

The installation includes a regulator circuit given overall reference **23** and including a general purge duct **24**. The general purge duct **24** has a top segment **24.1** that is oriented so as to trap bubbles of air rising from the substance. Said top segment **24.1** is connected to the connection member **11** by a vertical segment **24.2** followed by a connection segment **24.3**. In this example, the top segment **24.1** slopes very slightly relative to the horizontal towards the vertical segment **24.2**, i.e. the end of the top segment **24.1** that is connected to the remainder of the regulator circuit is higher than the end of the top segment **24.1** that is connected to the vertical segment **24.2**.

The top segment **24.1** is extended by a discharge duct **25** connected to a bottom branch of a T-coupling.

One of the side branches of the coupling is connected firstly to the top portion of the first vessel via a third control valve **26** and to the top portion of the second vessel via a fourth control valve **27** enabling the discharge duct **25** to be put into connection with both of the vessels.

The second side branch of the T-coupling is connected to a second feed duct **21** for feeding compressed air via a control valve **22**, which second compressed air feed duct **21** is thus also connected to the discharge **25**.

A substance presence sensor N1 is mounted on the general feed duct **12** in the vicinity of the connection member **11**, downstream from the pump **14**, in order to measure the presence of a quantity of substance in the general feed duct **12**.

Two substance presence sensors N2 and N3 are mounted on the vertical segment **24.2** in order to measure the presence of respective quantities of substance in the general purge duct **24**.

A substance presence sensor N4 is also mounted on the general feed duct **12** in the vicinity of the pump **14** and upstream therefrom, in order to measure the presence of a quantity of substance in the general feed duct **12**.

A pressure sensor P1 is mounted in the regulator circuit **23** downstream from the control valve **22** and level with said control valve **22** in order to measure the pressure in the regulator circuit at the outlet from the second compressed air feed duct **21**.

A pressure sensor P2 is mounted under the multichannel connection member **11** in order to measure the pressure in said multichannel connection member.

With reference to FIG. **2**, the multichannel connection member **11** comprises, in conventional manner, a first circular chamber **42** having connected thereto the supply pipes **7** for supplying the filler spouts **2** of the various filler stations in a regular distribution around an axis of symmetry of the multichannel connection member **11**. Also in known manner, the first chamber **42** is connected by a first connection duct **43** to the general feed duct **12** via a rotary coupling **44**.

The connection member also has a second chamber **45** concentric with the first chamber **42** and extending, in this example below the first chamber **42**, and being separate therefrom. A second duct **48** extends coaxially inside the first duct **43**. The bottom end of the second duct **48** opens out into the second chamber **45**, and the top end of the second duct **48** is connected to the inside of the rotary coupling **44** so as to provide a connection with the coupling segment **24.3** of the general purge duct **24** in order to connect the second chamber **45** to the general purge duct **24**.

The return pipes **10** of the various filler spouts **2** open out into the second chamber **45**.

In the present example, each return pipe **10** extends in a straight line parallel to the direction in which the associated supply pipe **7** extends. Like the supply pipes **7**, the return pipes **10** thus open out radially into the chamber under consideration.

In the present example, the return pipes **10** slope, like the supply pipes **7**, between their high ends connected to the chamber under consideration in the multichannel connection member **11** and their low ends opening out into a respective one of the spouts **2**.

The supply pipes **7** and the return pipes **10** are entirely independent of one another, such that the multichannel connection member **11** acts continuously for each filler station under consideration to connect in series the general feed duct **12**, the supply pipe **7**, the spout **2**, the return pipe **10**, and the general purge duct **24**.

Thus, inside the multichannel connection member **11** and for each spout **2**, there is no desired exchange of substance between the supply pipe **7** and the return pipe **10**. The substance enters into the multichannel connection member **11** via the general feed duct **12** and flows in succession along the first connection duct **43** and along the supply pipes **7** in order to reach the spouts **2**. Thereafter, the substance may potentially return via the return pipes **10** and then along the second connection duct **48** prior to reaching the general purge duct **24** outside the multichannel connection member **11**.

As can be seen in FIG. **3**, each spout **2** is also provided at its bottom end with at least one suction channel **30**. In this example, each spout **2** is provided with a single suction channel **30**. It should be understood that the suction channel **30** is distinct from the return pipe **10** and also from the supply pipe **7**.

Thus, each suction channel **30** extends between the outside of the spout body **6** and the inside of the spout body **6**. More precisely, the suction channel **30** opens out at a first end to the outside of the installation **1** (and thus to the outside of the filler station) and at a second end to the inside of the spout body **6** above the orifice **8**, and thus above at least the portion of the delivery valve that co-operates with the orifice in order to close it when the delivery valve closes the orifice, with the suction channel **30** nevertheless extending entirely in the bottom end of the spout body **6**.

The suction channel **30** has a connection segment **31** extending radially in the spout body **6** so as to open out at a first end to the outside of the spout body **6**, of the filler station, and of the installation **1**. In this example, the connection segment **31** extends substantially horizontally. Preferably, the suction channel **30** is also provided with a coupling **32** arranged in the first end of the connection segment **31**.

At its second end, the connection segment **31** is extended by a distribution portion **33** that matches the shape of the end

of the spout body **6**. In the present example, the distribution portion **33** is frustoconical in shape such that the distribution portion **33** surrounds the delivery valve and thus the orifice **8** over 360°. Specifically, the connection segment **31** extends so as to open out into the top of the distribution portion **33**.

The distribution portion **33** is extended by a junction portion **34** extending between the distribution portion **33** and the inside of the spout body **6**. In the present example, the junction portion **34** is toroidal in shape such that the distribution portion **33** surrounds the delivery valve **9** and thus the orifice **8** over 360°. Specifically, the junction portion **34** extends so as to open out into the bottom of the distribution portion **33**. The junction portion **34** extends substantially horizontally.

The suction channel **30** thus extends between the outside of the spout body **6** and the inside of the spout body **6** at the bottom end of the spout body **6** so as to open out inside the spout body **6** above the orifice **8**. More precisely, the suction channel **30** opens out inside the spout body **6** immediately above the seat **35** of the delivery valve **9**. In particular, in this example, the entire suction channel **30** extends in the bottom end of the spout **2**, which end (in the shape of a truncated cone) is of section that is smaller than the remainder of the spout body **6** (which is cylindrical in shape).

There follows a description of the operation of the installation.

On starting, the installation is full of air. The delivery valves **9** are closed. All of the control valves are closed.

Starting from this position, the air contained in the installation is purged in order to prepare the installation for delivering the substance contained in the first feed vessel **3**.

The control valves **15** and **26** are opened, and the pump **14** is activated so as to admit the substance under pressure from the first feed vessel **3** into the various ducts and pipes of the installation in order to purge them of the air that they contain, and this continues until the substance returns into the first feed vessel **3** via the discharge pipe.

The control unit controls the pump **14** on the basis of data transmitted by the various sensors (N**1**, N**2**, N**3**, N**4**, P**1**, and P**2**) and of a target filling rate at the spouts **2**. For example, in order to stop admitting the substance under pressure into the general feed duct **12**, the control unit can control the pump **14** so as to stop admitting substance under pressure into the general feed duct **12** once a determined time delay has elapsed from the moment when the sensor N**3** detects that the substance has reached and gone past the level of the sensor.

In order to prepare the installation for delivering substance, the control valve **22** is then opened to cause air under pressure to penetrate into the regulator circuit **23** and the pump **14** is also controlled so as to allow substance to rise into the first feed vessel **3**, should that be necessary. The delivery valves **9** are still closed.

The level of substance in the regulator circuit **23** is thus lowered progressively to reach the quantity of substance that is needed for packaging substance while allowing regulation. A portion of the regulator circuit **23** is thus purged of the substance.

Typically, the control unit controls the pump **14** as a function of the data transmitted by the pressure sensors P**1** and P**2** and by the presence sensors N**1**, N**2**, N**3**, and N**4** so as to reach the target quantity of substance in the regulator circuit **23** and so as to reach the target filling rate via the spouts **2**. Specifically, the quantity of substance in the regulator circuit **23** makes it possible to vary the delivery rate via the spouts **2**.

By way of example, the pump **14** is controlled so that the substance goes back down to the level of the sensor N**2**. The level of substance in the installation then corresponds at least to the total volume of the filler spout bodies **6** and of the feed ducts **7** of the filler spouts.

Production can then begin. It should be observed that the above-described preparation of the installation advantageously does not involve any substance being rejected.

During a production stage, the pump **14** is activated to admit the substance under pressure from the first feed vessel **3** into the general feed duct **12** and thus into the various supply pipes **7** and the spouts **2**.

The configuration with a general feed duct **12** in series with the regulator circuit **23** (and in particular with the general purge duct **24**) containing air provides the advantage of significantly improving the accuracy of metering, in particular when making use of weighing technology. Specifically, the presence of air in the general purge duct **24** serves to absorb pressure variations associated with opening and closing the spouts **2**, thereby making it possible to have a metering rate that is relatively stable.

While the substance is being packaged in the containers, the flow rate in the supply pipes **7** of the spouts **2** is controlled by the pump, with adjustment being possible by acting on the pressure of air in the top segment **24.1** of the general purge duct **24**. Specifically, variation of the total flow rate in the supply pipes **7** can be compensated by varying the level of substance in the vertical segment **24.2** of the general purge duct **24** so that the flow rate is substantially constant in each of the feed ducts **7** of the spouts **2**.

The control unit controls the pump **14** as a function of the data transmitted by the pressure sensors P**1** and P**2** and by the presence sensors N**1**, N**2**, N**3**, and N**4** and also as a function of the filling rate via the spouts **2** so as to maintain the target quantity of substance in the regulator circuit **23**. In this example, the filling rate via the spouts **2** corresponds to the instantaneous filling rate via each spout divided by the number of spouts that are open.

It should be observed that the spouts **2** are used not only for filling the containers, but also for connecting the supply pipes **7** in series with the return pipes **10** in order to maintain the target quantity of substance in the regulator circuit **23**.

If the vessel **3** is empty, it is possible to open the control valve **20** in order to maintain sufficient pressure in the installation for delivering substance.

When it is desired to change substance, the control valve **15** is closed and the substance that remains in the installation is drained. The draining step (which is described below) is also applied in the event that the sensor N**4** detects a lack of substance at its level, indicating that the first feed vessel **3** is empty. In this event, it is then essential to close the control valve **15**.

For draining purposes, the containers continue to be filled as during the production stage until the level of substance drops below the level of the sensors N**1** and N**2** and then flows out from the multichannel connection member **11** and the supply and return pipes **7** and **10** as a result of these pipes being connected together in series at the spouts **2**. The spouts **2** are thus fed with substance both via the supply pipes **7** and via the return pipes **10**.

At this stage it is also possible to open the control valve **20** in order to maintain sufficient pressure in the installation for delivering substance.

In the end, and as can be seen more clearly in FIG. **4**, only a small quantity of substance might possibly remain present

in the low portions of the spout bodies **6** situated above the delivery valves **9** and in the low portions of the corresponding return pipes **10**.

The control valves **15**, **26**, and **22** (and possibly also **20**) are then closed, and the pump **14** is stopped. The various delivery valves **9** are closed.

This residual quantity of substance is then sucked out, advantageously making use of the suction channel **30**.

For this purpose, suction means are coupled to the coupling **32** of said suction channel **30** prior to activating said means in order to suck out the residual substance while keeping the delivery valves **9** closed. The substance as sucked out in this way passes in succession through the junction portion **34**, the distribution portion **33**, and the connection segment **31**, prior to leaving the spout body **6**, the filler station, and the installation **1**. Once the substance has been sucked out, the suction means are separated from the installation **1**.

The substance that has been sucked out may then be discarded or it may be sold in a degraded form, e.g. by being diluted. There is thus only a very small loss of substance associated with this process of changing feed vessel.

Once the substance coming from the first feed vessel **3** has been drained, the installation is prepared for delivering the substance coming from the second feed vessel **13**.

For this purpose, during a first step, the installation is purged once more of the air that it contains, and then during a second step the level of substance in the regulator circuit **23** is lowered to reach the quantity of substance that is necessary for packaging the substance while making regulation possible. These two steps are identical to those described above with reference to the first feed vessel **3**, except that it is the control valves **16** and **27** that are controlled and not the control valves **15** and **26**.

In the same manner as for the first feed vessel **3**, during the production stage, the pump **14** is activated to admit the substance under pressure from the second feed vessel **13** into the general feed duct **12** and thus into the various supply pipes **7** and the spouts **2**.

When it is desired to change substance, or when the second feed vessel **13** is empty, the installation is drained in the same manner as described above for the first feed vessel **3**.

In the end, only a small quantity of substance might possibly remain present in the low portions of the spout bodies **6** situated above the delivery valves **9** and in the low portions of the corresponding return pipes **10**.

All of the control valves are then closed, and the pump **14** is stopped. This residual quantity of substance is then sucked out via the suction pipes, in the manner described above.

A new production cycle can then begin.

It is thus possible in very simple manner to change substance between two production cycles, and to do so without needing to have recourse to the large-sized collectors of the prior art.

Naturally, the invention is not limited to the embodiment described above, and variant embodiments may be provided without going beyond the ambit of the invention as defined by the claims.

In particular, although the installation is described with reference to metering by weighing with containers being supported by their bottoms, the invention applies equally to filler spouts associated with containers being supported by their necks and/or with metering by flow rate.

Although the invention enables a series of filler spouts to be fed simultaneously, the invention could be arranged to feed a single filler spout associated with a set of simple control valves associated with a network of ducts that are suitably interconnected.

The number of vessels in the installation could be greater than that described, and for example the installation could have at least two vessels, at least four feed vessels, at least five feed vessels, or at least six feed vessels.

Although above, the installation has at least one pressure sensor under the connection member, the pressure sensor could be arranged level with one of the presence sensors N**1** or N**2**.

Although a time period is determined from the moment when the sensor N**3** detects that the substance has reached and gone past its level, said moment could be determined from information about the flow rate through the pump, about the number of revolutions per minute of the associated motor, ...

Although above, the supply pipe opens out above the return pipe in the spout, the multichannel connection member could be shaped so that the return pipe opens out above the supply pipe. In addition, or as an alternative, the return pipes could be arranged above the supply pipes in the installation (relative to the in-service position of said installation).

Furthermore, it would be possible to reverse of the flow direction of substance through the connection member. The filler stations could thus be supplied via the duct **24** and purged via the duct **12**. It would then be the feed duct that is arranged inside the purge duct within the multichannel connection member.

The installation could include at least one circuit for facilitating degassing of the installation, and in particular a secondary purge circuit, e.g. arranged in parallel with the general purge duct.

Although above, the installation operates with compressed air, the installation could operate with air at atmospheric pressure, particularly, although not exclusively, for substances that are not very viscous and/or for low production rates. Preferably, although not exclusively, the installation is designed to operate with compressed air for substances that are viscous and/or for large production rates.

In the embodiment described, there is no cleaning operation (i.e. washing and/or rinsing). By way of example, this is possible when the substances for packaging are oils such as mineral oils. Nevertheless, it is possible to envisage associating filler stations of the invention with an installation that is also configured to allow the installation to be cleaned (washed and/or rinsed) between two production cycles. By way of example, this can be advantageous when the substance is a detergent, a cosmetic, ...

In general manner, the installation and the filler stations could be different from the above description. For example, the filler stations could be shaped to allow the substance to be looped by allowing optionally temporary communication between the supply and return pipes inside the multichannel member (e.g. by providing the multichannel member with a delivery member).

The invention claimed is:

1. A filler station for a packaging installation for packaging a substance in containers, the station comprising a filler spout having a spout body

with a top dedicated to connect to a supply pipe for supplying the filler spout and with a bottom end provided with an orifice fitted with a controlled delivery valve,

wherein the spout is fitted with a return pipe having one end that is fastened to the spout body and that is opened

out into the spout body above the delivery valve and below the zone where the supply pipe is dedicated to open out into the spout body,

wherein the spout is provided also with at least one suction channel, that is different from the return pipe, and that extends in the bottom end of the spout body between the outside of the filler station and the inside of the spout body so as to open out inside the spout body above the orifice, the suction channel thus being designed to extend in the bottom end of the spout body between the outside of the packaging installation and the inside of the spout body so as to open out inside the spout body above the orifice.

2. The station according to claim **1**, wherein the suction channel has a connection segment extending radially in the spout body so as to open out at a first end to the outside of the spout body.

3. The station according to claim **2**, wherein the first end of the connection segment includes a coupling.

4. The station according to claim **2**, wherein at its second end, the connection segment is extended by a distribution portion that matches the shape of the end of the spout body.

5. The station according to claim **4**, wherein the distribution portion is extended by a junction portion extending between the distribution portion and the inside of the spout body.

6. The station according to claim **1**, wherein the suction channel opens out inside the spout body immediately above a seat of the delivery valve.

7. The packaging installation for packaging a substance in containers, the installation including a station according to claim **1**.

8. A method of draining a filler station according to claim **1**, the method comprising the steps of connecting suction means to the suction channel and sucking out substance remaining in said station via the suction means while keeping the delivery valve closed.

9. The station according to claim **1**, wherein the suction channel opens out inside the spout body so as to be below the opening out of the return pipe inside the spout body.

10. A filler station for a packaging installation for packaging a substance in containers, the station comprising a filler spout having a spout body with a bottom end provided with an orifice fitted with a controlled delivery valve, the station being wherein the spout is provided with at least one suction channel extending in the bottom end of the spout body between the outside of the filler station and the inside of the spout body so as to open out inside the spout body above the orifice, the suction channel thus being designed to extend in the bottom end of the spout body between the outside of the packaging installation and the inside of the spout body so as to open out inside the spout body above the orifice, wherein the suction channel has a connection segment extending radially in the spout body so as to open out at a first end to the outside of the spout body and wherein at its second end, the connection segment is extended by a distribution portion that matches the shape of the end of the spout body.

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